REMARKS

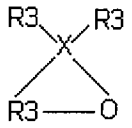
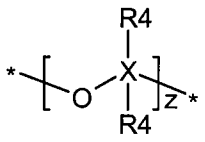
The Office Action dated July 11, 2007, has been carefully considered. Accordingly, it is believed that the present Amendment places the application in condition for allowance. Reconsideration is respectfully requested.

With this amendment, claims 4, 11, 15, 20, 23, and 26 are cancelled without prejudice. Claim1 is amended to recite the specific hydrolase enzymes trypsin and cutinase. Support for this amendment can be found, for example, in dependent claims 3 and 4 as originally filed. Claims 12 and 27 are amended to delete the term "condition." Claims 16, 32, and 33 are amended to recite specific organic reactants and hydrolase enzymes. Support for these amendments can be found, for example, at pages 8-9, paragraphs 37-38. Claims 19 and 24 are amended to correct terminology in light of the amendment to claim 16. Claims 33-35 are added. Support for these amendments can be found, for example, in the Examples at pages 13-40. It is believed that these changes do not involve any introduction of new matter, whereby entry is believed to be in order and is respectfully requested.

In the Office Action, claims 1, 4-16, and 19-32 were rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. Specifically, Examiner stated that while the specification was enabling for forming an organic siloxane by hydrolysis and condensation of an organic silane selected from trimethylethoxysilane; $(Me_3SiO(CH_2CH_2O)_4CH_3)$; 3-glycidoxypropyldimethethoxysilane; 1,1-dimethyl-1-sila-2-oxacyclohexane; and methyltriethoxysilane with trypsin or by condensation of the corresponding organic silanols with trypsin, it did not reasonably provide enablement for forming any organic compound by reacting any organic reactant or organic intermediate as defined in claims 1, 16, 31, and 32 with any hydrolase selected from trypsin, pepsin, papain, *Candida antarctica* lipase, *Candida antarctica* lipase B, *Rhizomucor miehei* lipase, wheat germ lipase, or a combination thereof. Additionally, the Examiner pointed to some of the compounds listed in the Examples and stated that if trypsin was unable to hydrolyze and condense those few molecules, then trypsin would not hydrolyze/condense all organic reactants within the scope of the claims and that the specification provided no guidance for selecting those that will be successful. Applicants

traverse this rejection and request reconsideration. Independent claims 1, 16, 31, and 32 have been amended to more particularly recite features of embodiments of the invention.

Claim 1 has been amended to recite a method of forming an organic molecule, comprising contacting a hydrolase enzyme with an organic reactant. The organic reactant comprises the formula:

$(R^1)_{4-n}X(OR^2)_n$ or  or 

X is selected from the group consisting of silicon and germanium. R^1 is selected from the group consisting of alkyl, haloalkyl, unsaturated alkyl, aryl, alcohol, epoxy, ether, amine, $-(OXR^4_2)_y-OXR^4_3$, and a combination thereof. R^2 is selected from the group consisting of alkyl, hydrogen, ether and a combination thereof. R^3 is selected from the group consisting of alkyl, unsaturated alkyl, aryl, hydrogen and a combination thereof. R^4 is selected from the group consisting of alkyl, haloalkyl, unsaturated alkyl, aryl, hydrogen, hydroxy, alkoxy, alcohol, epoxy, ether, amine, $-(OSiR^5_2)_y-OSiR^5_3$ and a combination thereof. R^5 is selected from the group consisting of alkyl, haloalkyl, unsaturated alkyl, aryl, hydrogen, hydroxy, alkoxy, alcohol, epoxy, ether, amine, and a combination thereof. n is an integer from 0 to 4. y is 0 or is an integer greater than 0 and z is 3 or is an integer greater than 3. The hydrolase enzyme comprises trypsin, cutinase or a combination thereof and the hydrolase enzyme catalyzes the hydrolysis and condensation of the organic reactant to form the organic molecule.

Claim 16 has been amended to recite a method of forming an organic molecule, comprising contacting a hydrolase enzyme with an organic reactant. The organic reactant is selected from the group consisting of: $(CH_3)_2Si(OCH_3)_2$; $(CH_3)(CF_3CH_2CH_2)Si(OCH_3)_2$; $(C_6H_5)(CH_3)Si(OCH_3)_2$; $(CH_3CH_2)_2Ge(OCH_2CH_3)_2$; $(CH_3)Si(OCH_2CH_3)_3$; $Si(OCH_2CH_3)_4$; 1,3,5,7-tetramethyl-1,3,5,7-tetramethoxy-cyclotetrasiloxane; 1,3-bis(hydroxy)tetramethyldisiloxane; $[(HO)_2(CH_3)SiO]_3SiCH_3$, or a combination thereof. The hydrolase enzyme is selected from the group consisting of: *Candida antarctica* lipase, *Candida antarctica* lipase B, *Rhizomucor miehei* lipase, wheat germ lipase, trypsin, cutinase, pepsin,

papain, or a combination thereof; and catalyzes the hydrolysis and condensation of the organic reactant to form the organic molecule.

Claim 31 has been amended to recite a method of forming an organic intermediate molecule, comprising contacting a hydrolase enzyme with an organic reactant. The organic reactant is selected from the group consisting of: $(CH_3)_2Si(OCH_3)_2$; $(CH_3)(CF_3CH_2CH_2)Si(OCH_3)_2$; $(C_6H_5)(CH_3)Si(OCH_3)_2$; $(CH_3CH_2)_2Ge(OCH_2CH_3)_2$; $(CH_3)Si(OCH_2CH_3)_3$; $Si(OCH_2CH_3)_4$; 1,3,5,7-tetramethyl-1,3,5,7-tetramethoxy-cyclotetrasiloxane; 1,3-bis(hydroxy)tetramethyldisiloxane; $[(HO)_2(CH_3)SiO]_3SiCH_3$, or a combination thereof. The hydrolase enzyme is selected from the group consisting of: *Candida antarctica* lipase, *Candida antarctica* lipase B, *Rhizomucor miehei* lipase, wheat germ lipase, trypsin, cutinase, pepsin, papain, or a combination thereof; and catalyzes the condensation of the organic reactant to form the organic intermediate molecule.

Claim 32 has been amended to recite a method of forming an organic molecule, comprising contacting a hydrolase enzyme with an organic intermediate reactant. The organic intermediate reactant is selected from the group consisting of: $(CH_3)_2Si(OH_2)_2$; $(CH_3)(CF_3CH_2CH_2)Si(OH_2)_2$; $(C_6H_5)(CH_3)Si(OH_2)_2$; $(CH_3CH_2)_2Ge(OH_2)_2$; $(CH_3)Si(OH_3)_3$; $Si(OH)_4$; 1,3,5,7-tetramethyl-1,3,5,7-tetrahydroxy-cyclotetrasiloxane; 1,3-bis(hydroxy)tetramethyldisiloxane; $[(HO)_2(CH_3)SiO]_3SiCH_3$, or a combination thereof. The hydrolase enzyme is selected from the group consisting of: *Candida antarctica* lipase, *Candida antarctica* lipase B, *Rhizomucor miehei* lipase, wheat germ lipase, trypsin, cutinase, pepsin, papain, or a combination thereof; and catalyzes the hydrolysis and condensation of the organic intermediate reactant to form the organic molecule.

The specification provides several examples of monofunctional and polyfunctional organic reactants that may be contacted with hydrolase enzymes to catalyze the formation of organic molecules and organic intermediates (see paragraphs 38-39 and the Examples). These examples range in scope for both the breadth of the organic reactant and the hydrolase enzyme, and Applicants have taken that disclosure and defined the genera of organic reactants/intermediates and hydrolase enzymes accordingly.

Responsive to the §112 rejection, Applicants are submitting the accompanying Declaration by the inventors that provides additional evidence that organic reactants and

hydrolase enzymes described in this specification, when reacted in accordance with teaching found in this specification, form organic molecules by the processes described and claimed herein.

While the Examiner has attempted to project doubt into the findings made by Applicants and disclosed in the specification as to trypsin and other hydrolase enzymes, such doubt is unfounded. Three of the four sources of trypsin tested both hydrolyzed and condensed the organic reactant/intermediate. And, even though there was believed to be a contamination with one of the hydrolase enzymes (which was discovered and corrected; see Example 4) there is no evidence that any of the tests relating to the other enzymes were not successful. In fact, in each instance pointed to by the Examiner as evidence of Applicants' failure to enable, Applicants state in the specification the perceived reason for the result. For example, for phenyldimethylethoxysilane, the specification states that "the decrease in enzymatic activity appeared to be due to the increased hydrophobicity and steric bulk of the phenyl substrates" (see page 32, paragraph 109). Also, with reference to heptamethylhydroxytetracyclosiloxane, the specification explains that the "organosilicon molecules and the resultant intermediates and products were different. Comparatively, the cyclic siloxane [from the heptamethylhydroxytetracyclosiloxane] is sterically larger than the cyclic alkoxysilane" (see pages 33-34, paragraph 111). Statements such as these do in fact give guidance to one of skill in the art.

Specifically with respect to amended claims 16, 31, and 32, those claims are now directed to a limited class of nine organic reactants, all of which are explicitly described in the specification. See, e.g., page 8, paragraphs 37 and 38. Also, with respect to newly-added claims 33-35, those claims are limited to limited classes of eight or nine reactants, all of which are explicitly described in the specification. Additionally, all of the recited hydrolase enzyme catalysts are explicitly described in the specification, and there are working examples showing that each of the recited enzymes catalyzed condensation of one or more organic reactants.

Thus, not only are the claims commensurate in scope with the enablement provided by the specification, but the specification provides additional information to help one of skill in the art select appropriate organic reactants and hydrolase enzymes. As a matter of Patent Office practice, a specification which contains a teaching of a manner and process of making and using

an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as in compliance with the enabling requirement of the first paragraph of section 12 *unless* there is reason to doubt the objective truth of the statements contained therein which must be relied on enabling support, *In re Marzocchi*, 169 USPQ 367, 369 (CCPA 1971).

A disclosure is enabling if, from the information set forth in the specification, coupled with information known in the art, one of ordinary skill in the art could make and use the invention without undue experimentation, *United States v. Teletronics, Inc.*, 8 USPQ2d 1217, 1224 (Fed. Cir. 1988). Moreover, every aspect of a generic claim certainly need not have been carried out by an inventor, or exemplified in the specification; rather, only a reasonable level of detail must be provided in order to enable members of the public to understand and carry out the invention, *Genetech v. Novo Nordisk, A/S,* 42 USPQ2d 1001, 1005 (Fed. Cir. 1997). Furthermore, Applicants are not required to provide working examples of every embodiment encompassed by their claims, even in an unpredictable art. *In re Angstadt,* 190 USPQ 214 (CCPA 1976). As the specification clearly defines organic reactants and hydrolase enzymes which fall within the scope of the claimed invention, and the Examiner has not provided any objective evidence of record that the present claims are not enabled, the specification must be taken as in compliance with 35 USC §112, first paragraph, *In re Marzocchi*, *supra*.

Applicants submit that claims 1, 5-10, 12-14, 16, 19, 21-22, 24-25 and 27-32, as amended, along with newly-added claims 33-35, are enabled by the specification, whereby the rejection under 35 U.S.C. §112, first paragraph, has been overcome. Reconsideration is respectfully requested.

In the Office Action, claims 1, 4-16, and 19-32 were also rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement. The Examiner stated that Applicants' disclosure in the specification for both the organic reactants and the hydrolases encompasses large genera of compounds/enzymes "for which most combinations will be unsuccessful." Applicants traverse this rejection and request reconsideration.

The Examiner's statement that *most* of the stated combinations of organic reactants/intermediates and hydrolases would be unsuccessful is unfounded. The few instances pointed to by the Examiner which showed a lower enzymatic activity do not justify the statement

that most of the stated combination would be unsuccessful. In actuality, Applicants have provided many examples in the specification, the majority of which showed that the specified hydrolase worked appropriately. For those compounds which showed a lower enzymatic activity, Applicants used the opportunity to explain the most likely reason for the reduced activity and therefore gave additional information to those of skill in the art in selecting appropriate compounds. Additionally, to further support that the Examiner's statement above has no merit, Applicants have submitted the accompanying Declaration under 37 USC §1.132 showing additional successful working examples obtained by following the teachings contained in the specification.

Just because there is no perfect category into which all of the organic reactants that have worked will fit does not mean that Applicants are limited only to those compounds that have been specifically disclosed. With respect to claim 1, Applicants have chosen to define the organic reactants in such a way as to include those classes of compounds that are believed to be operable. Where they have tested and found there to be less enzymatic activity, Applicants have given reasons as to why certain compounds falling within the broader definition had less enzymatic activity so that others could benefit from the guidance provided and to further define the genera of claimed compounds.

The written description requirement of a genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, disclosure of relevant, identifying characteristics, or a combination thereof. *See Regents of the Univ. of California v. Eli Lilly,* 119 F.3d 1559, 1568 (Fed. Cir. 1997), *cert. denied,* 523 U.S. 1089 (1998). A representative number of species means that the species described are representative of the genus. Thus, when there is variation within a genus, a description of a variety of species will reflect possession of the genus. Additionally, there is a strong presumption that an adequate written description of the claimed invention is present when the application is filed. *In re Wertheim*, 541 F.2d 257, 263 (CCPA 1976). Looking at the defined genus of organic reactants/intermediates and hydrolases and the entirety of Applicants' disclosure (containing multiple examples using different organic reactants/intermediates), Applicants submit that the rejection under 35 USC §112, first paragraph, has been overcome. Reconsideration is respectfully requested.

Also in the Office Action, claims 1, 4-5, 9-16, 19-20, and 24-32 were rejected under 35. USC §102(b) as being anticipated by Cha et al. (*Silicatein filaments and subunits from a marine sponge direct the polymerization of silica and silicones in vitro*). The Examiner asserted that Cha et al. teach the formation of phenylsilsesquioxane from tetraethoxysilane using an enzymatic hydrolysis and condensation with the proteases trypsin, papain or silacatein in aqueous buffer at neutral pHs and temperatures of 20°C. This assertion is inaccurate. Phenylsilsequioxane is taught to be formed from phenyltriethoxysilane. Additionally, the Examiner asserted that

> Applicants argument that BSA is shown in their specification as being unable to catalyze the reaction is not persuasive as the reactions are not the same. A different substrate was used by Cha et al. than used by Applicants and there is substantial evidence that not every protein can catalyze the reaction with every substrate.

However, as will be set forth in detail below, Applicants submit that the methods defined by claims 1, 5-10, 12-14, 16, 19, 21-22, 24-25 and 27-32 are not anticipated by Cha et al. Accordingly, this rejection is traversed and reconsideration is respectfully requested.

First, Applicants point out that statement above appears to be an admission by the Examiner that Cha et al. does not anticipate. If the results of Cha et al. are not applicable to any substrate other than the one used due to evidence that not every protein can catalyze the reaction with every substrate, and the substrate used by Cha et al. was different than Applicants' substrate, then Cha et al. cannot anticipate.

Additionally, Applicants use BSA as a control in their application to identify those hydrolase enzymes which are acting as non-specific catalysts. Thus, even if the above is found not to be an admission, in Example 10 Applicants investigated the condensation reaction of tetraethoxysilane with trypsin as a catalyst. In that Example, Applicants found that in comparison to a control reaction, trypsin did not catalyze the polycondensation of tetraethoxysilane in an aqueous medium at pH 6.8. Specifically, trypsin did not hydrolyze or condense tetraethoxysilane during the three-hour reaction (page 34, paragraph 112). As the reaction in Cha et al. was even shorter, 15 minutes, Applicants find no teaching in Cha et al. of a method of forming organic molecules using the specific hydrolase enzymes recited in the claims.

To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. The disclosure must be enabling to have placed it in the possession of a person of ordinary skill in the field of the

invention. Furthermore, a generic disclosure does not by itself describe Applicants' claimed invention within the meaning of 35 USC §102. Rather, such a prior art reference must further provide a more specific, limited teaching in order to anticipate. In view of the failure of Cha et al to teach or recognize the methods as recited in claims 1, 5, 9-16, 20 and 24-32, the reference does not enable one skilled in the art to practice those methods. It is therefore submitted that Cha et al. do not anticipate claims 1, 5-10, 12-14, 16, 19, 21-22, 24-25 and 27-32 under 35 USC §102.

Also in the Office Action, claims 1, 5, 9-16, 20, and 24-32 were rejected under 35 USC §103(a) as being unpatentable over Friedrich (WO02/22842) in view of the 1997 Sigma catalog. The Examiner stated that Friedrich teaches the formation of organic siloxanes from a variety of organic silanes using an enzymatic hydrolysis and condensation with a lipase. The Examiner admitted, however, that Friedrich does not teach using the lipases recited in the instant claims.

Friedrich discloses the polycondensation of organic silicon compounds in the presence of a lipase enzyme. Friedrich discloses that all lipases are suitable for the process of its invention and preferred lipases are from the *Pseudomonas* species (see page 2, lines 10-11 of CA 2,422,600 English translation of WO 02/22842). Contrary to this teaching, Table 2 of the present application sets forth a variety lipase enzymes that are not able to catalyze the hydrolysis and condensation of the specific organic reactant encompass within Applicants' claims. Included within this Table are *Pseudomonas cepacia* lipase and *Pseudomonas fluorescens* lipase, which are preferred lipase enzymes according to Friedrich. The present specification describes these lipase enzymes, as well as other lipase enzymes listed in the Sigma catalog, are unable to catalyze the hydrolysis and condensation of those organic reactants encompassed by Applicants' claims. Thus, in spite of Friedrich et al.'s statement that any lipase is suitable for the polycondensation of organic silicon compounds, that is clearly not the case. As Friedrich give only guidance contrary to the teachings of Applicants specification, one skilled in the art would not be led to select the specific lipases taught and claimed by Applicant when given Friedrich and the Sigma catalog. Actually, more than likely, one skilled in the art would select lipases which Applicants have specifically described as inoperable.

References relied upon to support a rejection under 35 USC §103 must provide an enabling disclosure, i.e., the must place the claimed invention in the possession of the public, *In*

re Payne, 203 USPQ 245 (CCPA 1979). Further, it is error to find obviousness where references diverge from and teach away from the invention at hand. *In re Fine,* 5 USPQ1596, 1599 (Fed. Cir. 1989). As the teachings of Friedrich et al. contradict those of Applicants, Applicants submit that Friedrich et al. teach away from the claimed invention and do not support a rejection under 35 USC §103. Thus, in view of the failures of Friedrich et al. to suggest or recognize the methods as claimed, claims 1, 5-10, 12-14, 16, 19, 21-22, 24-25 and 27-32 are patentable over Friedrich et al. The rejection under 35 USC §103 has been overcome, and reconsideration is respectfully requested.

It is believed that the above represents a complete response to the rejections set forth in the Office Action, and places the present application in condition for allowance. Reconsideration and an early allowance are requested.

Respectfully submitted,

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